

# 记山东泗水真恐角兽属一新种<sup>1)</sup>

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**关键词** 山东泗水 中一晚始新世(?) 冠齿兽科

## 内 容 提 要

本文所记述的冠齿兽类化石采集于山东泗水盆地始新世地层中。其个体巨大,前臼齿原尖呈孤立锥形并紧靠前尖,原尖和前尖近等高;臼齿脊形化程度高,中附尖近孤立锥形,原尖和后尖更靠近舌面。据此特征将它归入真恐角兽属,并建立一新种——泗水真恐角兽 (*Eudinoceras sishuiensis* sp. nov.)。本文将该种与冠齿兽科其它相近属种进行了比较,初步探讨了该科动物演化的可能趋势,并对黄庄动物群时代及与地层有关的问题进行了讨论。

山东中西部泗水盆地是近年新发现的始新世化石点。1985—1986 年期间,古脊椎动物与古人类研究所王景文,山东省地质科学研究所沙业学以及山东省博物馆石荣琳等对该区进行过地质调查,获取了大量化石标本,并在该区测制了新的地层剖面,建立了晚始新世黄庄组(沙业学、王景文,1985)。1992—1993 年期间,王景文、王钊及笔者进一步在曲阜黄庄及其邻近地区考查,又采集到不少有价值的标本,这些发现为冠齿兽科动物的演化趋势及黄庄动物群时代的探讨提供了重要的依据。本文所记述的化石材料即发现于泗水县东黄庄附近一较大冲沟中。

## 化 石 记 述

哺乳动物纲 *Mammalia* Linnaeus, 1758

全齿目 *Pantodonta* Cope, 1873

冠齿兽科 *Coryphodontidae* Marsh, 1876

真恐角兽属 *Eudinoceras* Osborn, 1924

泗水真恐角兽 *Eudinoceras sishuiensis* sp. nov.

(图 1, 2; 图版 I)

**正型标本** 残破左、右上颌骨。左  $P^1-M^3$  和右  $P^1-M^3$  均完整,左、右上犬齿及一颗左上门齿不在原位。中国科学院古脊椎动物与古人类研究所化石编号: V10806。

**地点和层位** 山东泗水东黄庄东南狼头沟;中始新世晚期—一晚始新世早期(?);黄庄

1) 本课题由中国科学院古生物学和古人类学科基础研究特别支持基金资助。

组。

**种名来源** 取化石产地泗水作为其种名。

**特征**<sup>1)</sup> 个体巨大。上犬齿相当粗壮。前臼齿原尖呈孤立锥形并紧靠前尖,且两齿尖近等高,V形脊两翼夹角小。臼齿为强脊形齿,原尖和后尖相对更靠近舌面;中附尖发育,呈锥形;后尖V形脊两翼夹角中等;臼齿前、后和内齿带发育。

**描述** 左、右上颌骨残破,颧骨突保留。牙齿齿冠磨蚀程度中等,应为一成年个体,是本属中迄今所见最大的标本。鉴于野外发掘中上犬齿埋藏在上腭背前侧,故推断其与上腭一起代表同一个体。

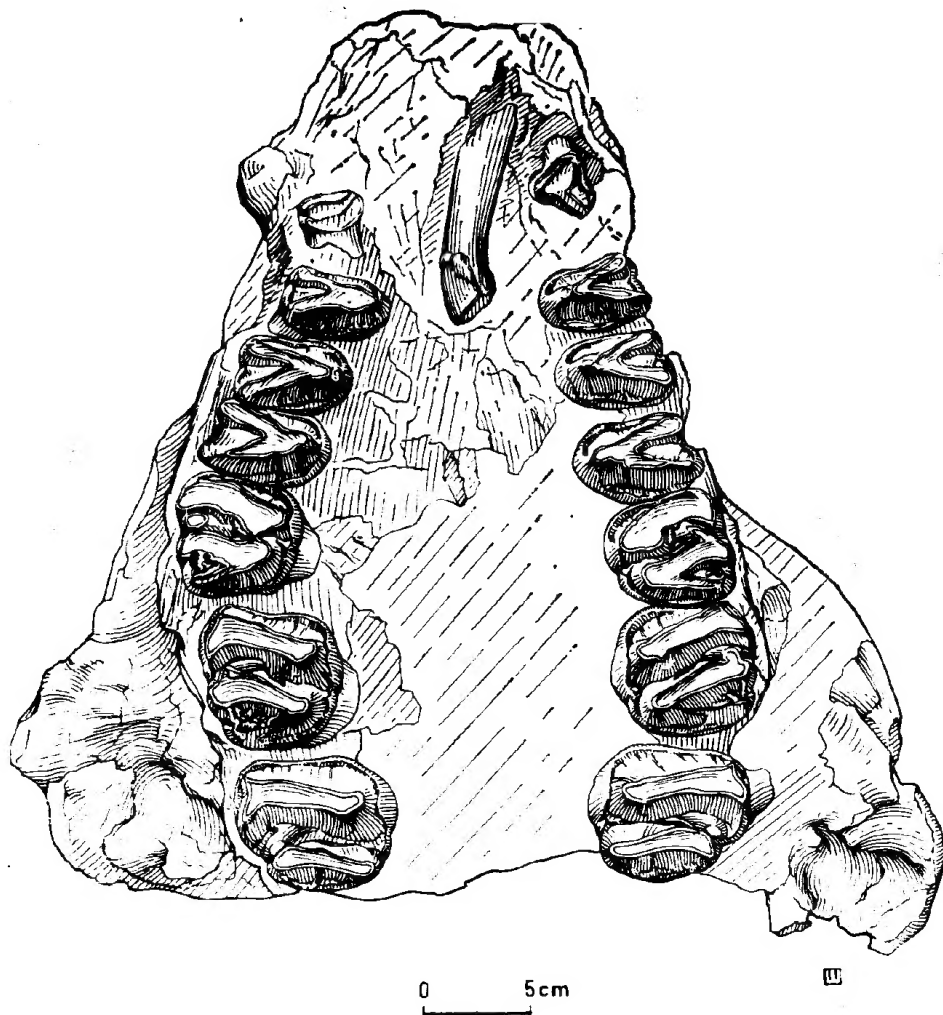


图1 泗水真恐角兽(新种)上腭冠面视

Fig. 1 *Eudinoceras sishuiensis* sp. nov., palate, occlusal view

冠面视颧骨突前缘伸至  $M^1$  外侧,后缘在  $M^3$  外侧中部。左、右两侧牙齿成略带弧

1) 文中臼齿构造名称依 H. F. Osborn 和 W. Granger (1931)。

度的八形排列。牙齿的长和宽从  $P^1-M^3$  逐渐增大。

左上门齿 非原始位置,其所露齿根很长,达 80mm。齿冠冠面视为长三角形,唇侧视成五边形,唇侧较舌侧磨蚀程度深,唇侧和舌侧齿带中等发育,推测其为  $I^2$  或  $I^3$ 。

上犬齿 异常粗状,整体稍向后弯曲成弧形,齿冠顶部和齿根底部缺失,其保存部分长约 360mm。齿冠基部断面呈椭圆形(75mm × 52mm),向上逐渐过渡为近半圆形。齿冠外侧磨面平整,腐蚀程度中等,有宽、窄两条浅的槽状纵沟,并由中部一直延伸到基部。齿根因埋藏中受压而稍变形。

上前臼齿  $P^2-P^4$  均具三个齿根。V 形脊两翼不对称,前翼较后翼磨蚀程度深。

$P^1$  明显小于其它前臼齿。冠面视呈近等边三角形,左  $P^1$  的 V 形脊夹角约  $70^\circ$ ,具发育的外齿带;右  $P^1$  整体倒向前侧。

$P^2-P^4$  冠面横宽,舌侧圆凸,唇侧内凹。原尖均呈孤立锥形。V 形脊夹角  $50^\circ$  左右,后翼近直立,稍长于前翼。前、后齿带相当发育,内、外齿带中等发育,齿带与齿尖基部相连。其中,左  $P^2$  原尖紧靠前尖,两齿尖上部被一明显小沟隔开,原尖顶部稍低于前尖,而右  $P^2$  的原尖、前尖部位磨蚀程度很深,此沟不见; $P^3$ 、 $P^4$  上的原尖、前尖近等高,且后侧视前尖外侧因磨蚀而形成深的凹陷, $P^3$  中原尖和前尖之间的隔沟已不明显,在  $P^4$  原尖和前尖则因顶部磨蚀而相汇。

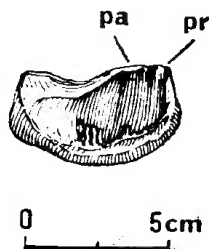


图 2 泗水真恐角兽(新种)  
*Eudinoceras sishuiensis* sp. nov.  
右  $P^3$  侧视 (lateral view)

上臼齿 均具三个齿根;原脊与后尖 V 形脊前翼近平行,两平行脊与牙齿纵轴略成斜交;中附尖发达,呈孤立突出的锥体形,并稍向唇侧倾斜,前、后和内齿带相当发育。

$M^1$  冠面近方形;具原小尖;后尖 V 形脊发育,夹角  $40^\circ$  左右。

$M^2$  和  $M^3$  冠面呈梯形;具原小尖痕迹;原尖和后尖更靠近舌面,尤以后尖最明显;原脊靠唇侧部由前附尖和前尖构成棱脊斜向后侧弯折延伸,并逐渐变低,达中附尖外侧; $M^2$  后尖 V 形脊夹角亦  $40^\circ$  左右,而  $M^3$  中 V 形脊后翼已基本消失,仅存痕迹,在后尖内侧发育一类似次尖的小尖,它与原尖基部向后延伸的内齿带相连。

**比较** 1845 年,欧文首次记述了欧洲下始新统的冠齿兽类化石。之后的一百五十年里,又陆续在欧洲的早始新世地层,北美的古新世晚期到早始新世早期地层中,以及亚洲的始新世各期地层中发现此类化石。迄今为止,冠齿兽科 (Coryphodontidae) 包括以下六属:

冠齿兽 *Coryphodon* Owen, 1845

真恐角兽 *Eudinoceras* Osborn, 1924

盔冠齿兽 *Hypercoryphodon* Osborn et Granger, 1932

亚洲冠齿兽 *Asiocoryphodon* Xu, 1976

后冠齿兽 *Metacoryphodon* Chow et Qi, 1982

异冠齿兽 *Heterocoryphodon* Lucas et Tong, 1987

表 1 泗水真恐角兽上牙测量(单位: 毫米)  
Table 1 The measurements of upper teeth of  
*Eudinoceras sishuiensis* sp. nov. (inmm)

|             |            | I <sup>2</sup> 或 I <sup>3</sup> | P <sup>1</sup> | P <sup>2</sup>                 | P <sup>3</sup> | P <sup>4</sup> | M <sup>1</sup>                 | M <sup>2</sup> | M <sup>3</sup> |
|-------------|------------|---------------------------------|----------------|--------------------------------|----------------|----------------|--------------------------------|----------------|----------------|
| 长<br>length | 左<br>left  | 19                              | 24             | 28                             | 27             | 36             | 55                             | 64             | 62             |
|             | 右<br>right |                                 | 20             | 27.5                           | 31             | 33             | 53                             | 65             | 60             |
| 宽<br>width  | 左<br>left  | 31                              | 26             | 46.5                           | 52             | 56             | 51                             | 63             | 70             |
|             | 右<br>right |                                 | 25.5           | 44                             | 48             | 56             | 54                             | 61.5           | 68.5           |
| 长<br>length |            | P <sup>1</sup> —P <sup>4</sup>  |                | M <sup>1</sup> —M <sup>3</sup> |                |                | P <sup>1</sup> —M <sup>3</sup> |                |                |
|             | 左<br>left  | 167(?)                          |                | 183                            |                |                | 325                            |                |                |
|             | 右<br>right | 134                             |                | 193                            |                |                | 320                            |                |                |

新材料与 *Eudinoceras* 最相似,两者前臼齿的原尖均呈孤立的锥形;而在 *Hypercoryphodon*、*Heterocoryphodon* 和 *Coryphodon* 中均具形态不同的原尖 V 形脊;在 *Metacoryphodon* 中 P<sup>2</sup>、P<sup>3</sup> 具原尖前棱及弱的后棱 (Qi, 1987); *Asiocoryphodon* 中则具较弱的原尖前、后棱。

另外,与其它冠齿兽相比,区别还在于: 1) 脊形化程度不同。在已知的冠齿兽类中, *Hypercoryphodon* 的 M<sup>1</sup>—M<sup>3</sup> 齿尖很不明显,脊形化程度最高;新种 *E. sishuiensis* 在 M<sup>1</sup> 原脊上保留原小尖,而 M<sup>2</sup>、M<sup>3</sup> 仅存弱的痕迹,脊形化程度稍低于 *Hypercoryphodon*,但却高于其它已知属。2) 臼齿原尖 V 形脊发育程度不同。*E. sishuiensis* 中 V 形脊后翼消失;在 *Metacoryphodon*、*Heterocoryphodon*、*Asiocoryphodon* 中 V 形脊靠舌侧成肘形,可见残存的后翼痕迹。而 *Coryphodon* 中则发育短的 V 形脊后翼。3) 个体大小不同。*E. sishuiensis* 和 *Hypercoryphodon* 大小相近,与始新世早、中期的 *Metacoryphodon*、*Heterocoryphodon*、*Asiocoryphodon*、*Coryphodon* 相比,个体较大。因此,依上述比较,笔者认为新材料应归入真恐角兽属。

至今,真恐角兽属已记述了五种: 即蒙古种 *E. mongoliensis* (Osborn, 1924)、柯鲁勃契种 *E. kholobochiensis* (Osborn et Granger, 1931)、粗壮真恐角兽 *E. crassum* (童永生、汤英俊, 1977)、*Eudinoceras* sp. (周明镇、胡长康, 1956) 和奥白依兰种 *E. obailiensis* (Gabounia, 1962)。将 *E. sishuiensis* 与同属中其它种进行比较: 1) 从个体大小看, *E. crassum* 显著大于 *E. mongoliensis* 和 *E. kholobochiensis*, 而 *E. sishuiensis* 比 *E. crassum* 更为庞大,是该属中已知最大的种; 2) *E. sishuiensis* 的上前臼齿原尖锥形程度相对其它种更为突出,而原尖紧靠前尖,且二者顶部近等高是其所独有的特点。另外,其 V 形脊两翼对称性却不如 *E. mongoliensis*; 3) 其臼齿原尖、后尖较 *E. mongoliensis*。

*sis* 和 *E. kholobochiensis* 更加靠近舌面; 尤以  $M^2$ 、 $M^3$  的后尖最为明显, 几达舌面; 4) 在 *E. crassum* 仅存的  $M^2$  中, 原小尖痕迹已消失, V形脊两翼夹角  $30^\circ$  左右, 而在 *E. sishuiensis* 中  $M^2$ 、 $M^3$  均保留原小尖痕迹, 后尖 V形脊两翼夹角  $40^\circ$  左右, 内齿带较 *E. crassum* 更为发育。至于 *E. obailiensis* 和 *Eudinoceras* sp., 个体显著小于真恐角兽属其它已知种, 前臼齿原尖基部保留弱的原尖前、后棱痕迹, 并且前者臼齿原尖 V形脊后翼痕迹明显, 其特点与 *Metacoryphodon* 更为相似, 童永生将其归入 *Metacoryphodon* (童永生, 1989a), 笔者认为合适的。

**讨论** 目前, 有记载的真恐角兽只分布于亚洲, 在我国山东、新疆、内蒙、广西、河南(?) (周明镇等, 1973; 童永生、王景文, 1980)、湖北(?) (Teilhard de Chardin et Young, 1936; 徐余瑄, 1980) 和北京的长辛店(?) (翟人杰, 1977) 等地均有发现。

本文所述材料与已知的真恐角兽相比, 它有一些独具的特点: 前臼齿( $P^1$  除外) 原尖不仅为孤立的锥形, 而且紧靠前尖, 并与前尖近等高。此外, 在已发现的冠齿兽科的其它属中, 原尖均明显低于前尖, 且二者不紧靠。因而这一特点是否是属一级间的差别, 还有待今后发现更多的材料予以确定。

冠齿兽类主要繁盛于始新世, 前面已讨论了真恐角兽属与冠齿兽科其它属之间的主要差别, 其中 *Eudinoceras* 与 *Hypercoryphodon* 虽近同期、且均较进步, 但仍存在显著差异(童永生、汤英俊, 1977), 笔者暂将 *Hypercoryphodon* 不考虑在内, 结合其它各属的特点, 可将始新世冠齿兽科的演化分为早、中、晚期三个阶段, 从中可发现以下几种演化趋势: 1) 始新世早期, 如 *Coryphodon*、*Asiocoryphodon* 中的  $P^1$ – $P^4$  发育原尖 V形脊 (Osborn, 1898) 或具原尖前、后棱; 而到中期, 如 *Metacoryphodon* 则至少  $P^4$  原尖已为锥形,  $P^2$ 、 $P^3$  仍具原尖前棱和较弱的后棱; 到晚期如 *Eudinoceras*, 其  $P^2$ – $P^4$  的原尖前、后棱消失, 成锥形。2) 臼齿脊形化程度从早期、中期到晚期由弱逐渐变强。3) 臼齿原尖 V形脊后翼从早期的较短, 到中期保留痕迹, 至晚期后翼消失, 形成单一的原脊。4) 臼齿原尖 V形脊前翼同后尖 V形脊前翼亦从早期的不平行到中期近平行至晚期达到平行, 反映后尖 V形脊的夹角逐渐减小。5) 臼齿后尖 V形脊前翼从早期明显短于原尖 V形脊前翼至中、晚期逐渐增加到近等长, 体现后尖的位置向舌侧位移的变化过程。

1992、1993 年王景文、王钊及笔者曾对黄庄组进行考查, 发现原黄庄组地层下限划分上尚存疑问。另就黄庄动物群而言, 目前已发现有 7 目, 其中哺乳类 5 目, 已鉴定到属的有 9 属, 共 15 个种, 还有部分标本有待研究(沙业学、王景文, 1985; 石荣琳, 1989)。而 9 属中有 7 属可在不同地区伊尔丁曼哈期动物群中找到, 有 8 属则见于不同地区沙拉木仑期动物群中。这表明黄庄动物群同伊尔丁曼哈期动物群及沙拉木仑期动物群均具可比性, 而与丁素因、郑家坚等(1977)以及童永生(1989b)的文中所述洞均动物群的特点相似, 二者都见有 *Eudinoceras*、*Diplolophodon*、*Forstercooperia*。从动物群组成成员上反映出黄庄动物群和洞均动物群很可能都是伊尔丁曼哈期动物群向沙拉木仑期动物群过渡的。黄庄动物群中的 *Diplolophodon* 目前仅见于沙拉木仑期动物群中, 其它如 *Yuomys*、*Deperetella*、*Eomoropus*、*Anthracoeryx* 亦较多的出现在沙拉木仑期动物群中。因而可否认为黄庄动物群的面貌相对更偏向于沙拉木仑期动物群, 而将以前仅见于伊尔丁曼哈期动物群的 *Breviodon* 作为伊尔丁曼哈期的残存属看待。据此黄庄动物群的时代或可同

沙拉木仑期,即晚始新世早期时代相当。当然,黄庄组的时代下限亦很可能下延到伊尔丁曼哈期,即中始新世的晚期。另据本文中所述的 *E. sishuiensis*,其  $M^2$ 、 $M^3$  原小尖痕迹保留,较洞均动物群的 *Eudinoceras crassum* 为原始,时代不是没有可能稍早。

笔者在野外工作期间,得到王景文先生、王钊先生的热情关心和帮助;在室内化石修理及文章撰写过程中一直得到翟人杰先生、童永生先生、王景文先生的悉心指导和帮助鼓励;另外,齐陶先生和阎德发先生将对标本及有关参考文献提供给笔者,郑家坚先生和王晓鸣先生还抽出时间帮助笔者修改中文及部分英文文稿;文中插图是由李荣山先生精制,图版由张杰先生摄制,在此,由衷地感谢这些老师和同志对笔者各方面的帮助。

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### 参 考 文 献

- 丁素因、郑家坚、张玉萍、童永生,1977: 广西百色盆地六组、洞均组的时代及脊椎动物群性质。古脊椎动物与古人类,15(1),35—43。
- 石荣琳,1989: 山东曲阜晚始新世黄庄动物群。古脊椎动物学报,27(2),87—102。
- 沙业学、王景文,1985: 山东首次发现晚始新世哺乳动物化石地点。古脊椎动物学报,23(4),295—299。
- 周明镇、胡长庚,1956: 新疆钝脚类化石的发现。古生物学报,4(2),239—241。
- ,李传夔、张玉萍,1973: 河南、山西晚始新世哺乳类化石地点与化石层位。古脊椎动物与古人类,11(2),165—181。
- ,齐陶,1982: 山东新泰中始新世化石哺乳类新材料。古脊椎动物与古人类,20(4),302—314。
- 徐余琰,1976: 河南淅川早始新世冠齿兽化石。古脊椎动物与古人类,14(3),185—193。
- ,1980: 湖北宜昌冠齿兽化石的新材料。古脊椎动物与古人类,18(4),296—298。
- 童永生、汤英俊,1977: 记真恐角属一新种。古脊椎动物与古人类,15(2),139—142。
- ,王景文,1980: 河南潭头、卢氏和灵宝盆地上白垩统——下第三系的划分。古脊椎动物与古人类,18(1),21—27。
- ,1989a: 新疆准噶尔盆地三个泉地区几种始新世哺乳类。古脊椎动物学报,27(3),182—191。
- ,1989b: 中国始新世中、晚期哺乳动物群。古生物学报,28(5),663—680。
- 翟人杰,1977: 论长辛店的地质时代。古脊椎动物与古人类,15(3),173—175。
- Gabunia L.K., 1962: On the remains of Eocene Mammals from the Obailian Formation of Zaissan Depression. Akad. Nauk Gruz. SSR, Inst. Paleobiol., Trudy, 7, 15—28。
- Lucas G. and Tong Yongsheng, 1987: A new Coryphodontid (Mammalia, Pantodonta) from the Eocene of China. Jour. Vert. Paleont., 7(4), 362—372。
- Osborn H.F., 1898: Evolution of the Amblypoda. Part 1. Taligrade and Pantodonta. Bull. Amer. Mus. Nat., 10(2), 169—218。
- , 1924: *Eudinoceras*, Upper Eocene Amblypod of Mongolia. Amer. Mus. Novitates, 145, 1—5。
- and W. Granger, 1931: Coryphodon of Mongolia, *Eudinoceras mongoliensis* Osborn, *E. Kholobochiensis* sp. nov. Amer. Mus. Novitates, 459, 1—13。
- and ———, 1932: Coryphodonts and Uintatheres from the Mongoliensis Expedition of 1930. Amer. Mus. Novitates, 512, 1—16。
- Qi Tao, 1987: The middle Eocene Arshanto Fauna(mammalia) of inner Mongolis. Ann. Carnegie Mus., 56(1), 1—73。
- Teilhardde Chardin, C. and C.C. Young, 1936: A Mongolian Amblypoda in the Red Beds of Ichang (Hupei). Bull. Geol. Soc. China, 15(2), 217—224。

## A NEW SPECIES OF *EUDINOCERAS* (PANTODONTA, MAMMALIA) FROM SISHUI, SHANDONG PROVINCE

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**Key words** Sishui, Shandong; Middle-Late Eocene; Coryphodontidae

### Summary

A new species of *Eudinoceras* (Pantodonta, Mammalia) is described in this paper. The material, including left and right maxillas and two upper canines, were collected from the Eocene of Sishui Basin, Shandong province in 1992.

The new species is typified by its large size. Upper premolars have prominent conical protocones which are very close to paracones, and of almost the same height as paracones; protoloph and V-shaped loph of metacones of molars are fully lophoid, mesostyles are isolated and conical, protocones and metacones are relatively lingually located.

### Systematic Description

**Class Mammalia** Linnaeus, 1758

**Order Pantodonta** Cope, 1873

**Family Coryphodontidae** Marsh, 1876

***Eudinoceras*** Osborn, 1924

***Eudinoceras sishuiensis* sp. nov**

(figs. 1–2; pl. I)

**Holotype** Left and right maxillas, with relatively well-preserved  $P^1$ – $M^3$ , isolated left and right canines (incomplete), and a left incisor (IVPP, V10806).

**Locality and Horizon** Village Donghuangzhuang of Sishui County, Shandong Province; Huangzhuang Formation, Late Middle–Eocene–Early Late–Eocene.

**Diagnosis** Very large in size. Canines very robust; Isolated and conical protocones of  $P^2$ – $P^4$  close to paracones, and nearly the same height as paracones; Protoloph and V-shaped loph of metacones of molars fully lophoid; Mesostyles isolated and conical; Protocones and metacones of molars relatively located to the lingual side. Moderate angles of V-shaped crests on molars; Cingula well-developed on anterior, posterior, interior edges.

**Description** Dorsal part of maxillas are absent, only two pieces of left and right broken maxillas with incompleting zygomatic process preserved. It represents an adult individual.

Crown view: Anterior margin of zygomatic process extends to the transverse

line of the middle of  $M^1$ , and posterior margin extends to the transverse line of the middle of  $M^3$ . Both length and width of the upper dentition from  $P^1$  to  $M^3$  are gradually enlarged.

Left upper incisor: The incisor is dislocated from its original position. Length of naked root is nearly 80mm. The inner side of the tooth is more worn than the outer side. Its interior cingulum and exterior cingulum are moderately developed. It may be  $I^2$  or  $I^3$ .

Upper canines: Canines are extremely robust, but not strong flaring. The top of the crown and bottom of the root are both damaged, the remaining part of which is about 360mm. The basal section of crown is oval (75mm  $\times$  52mm), and the section becomes a semicircle toward the tips. The outer side is worn moderately with its worn surface flattened. There are two grooves (wide and narrow) from the mid-part to the base-part on the crown.

Upper premolars: Each tooth has three roots. Wings of V-shaped lophs are not symmetric. Posterior wings are longer and also more worn than anterior wings.

$P^1$  It is the smallest one in the premolars. Angle of the V-shaped loph is about  $70^\circ$ .

$P^2$ — $P^4$  The crown is transversely broad. The isolated protocones which are very closed to paracones, have nearly the same height as paracones. In lateral view, the inner side of paracones have deep depression because of wear. V-shaped lophs form an angle of  $50^\circ$ . Posterior wings are vertical, not much longer than anterior wings. Anterior and posterior cingula are fairly developed, whereas interior and exterior ones are slightly less developed.

Upper molars: They all have three roots. Protolophs are parallel with anterior wings of V-shaped lophs of metacones. Mesostyles, directed slightly to the outer side, are well-developed. Anterior, posterior and interior cingula are prominent, and all connected to the base-part of every cone.

$M^1$  The crown is square. It has a paraconule.

$M^2$  and  $M^3$   $M^2$  and  $M^3$  look like trapezoid. They only have traces of the paraconule. Metacones approaches more to the lingual side than that of protocones. A crista formed by parastyle and paracone extends backward to the outer side of mesostyle. In  $M^3$  the posterior wing of V-shaped loph has almost disappeared.

**Comparison** Up to now, there are six genera of Coryphodontidae were described. They are:

*Coryphodon* Owen, 1845

*Eudinoceras* Osborn, 1924

*Hypercoryphodon* Osborn et Granger, 1932

*Asiocoryphodon* Xu, 1976

*Metacoryphodon* Chow et Qi, 1982

*Heterocoryphodon* Lucas et Tong, 1987

Differences between new species and other genera of Coryphodontidae are as follows: Firstly, The protocones of *E. sishuiensis* are isolated and conical in premolars. Secondly, protolophs and V-shaped lophs of metacones of molars are more lophoid than other genera of earlier Eocene. Thirdly, Posterior wings of V-shaped lophs of

M<sup>3</sup> has almost disappeared. This character can be regarded as the additional feature of *Eudinoceras*. Forthly, it is larger than other genera of early and middle Eocene. So the new species has been assigned to *Eudinoceras*.

Up till now, five species of *Eudinoceras* have been described: *E. mongoliensis* Osborn, 1924; *E. kholobochiensis* Osborn et Granger, 1931; *E. sp.*, 1956; *E. obailiensis* Gabounia, 1962; *E. crassum* Tong et Tang, 1977. *E. sishuiensis* is the largest one of *Eudinoceras* in size. The distinctive character of *E. sishuiensis* is that the protocones of premolars are close to paracones, and have the equivalent height to paracones. V-shaped lophs of premolars are less symmetric than *E. mongoliensis*. Protocones and metacones of molars are more closer to the lingual side than *E. mongoliensis* and *E. Kholobochiensis*, especially on M<sup>2</sup> and M<sup>3</sup>. Molars of *E. sishuiensis* differ from those of *E. crassum* by their traces of paraconules of M<sup>2</sup> and M<sup>3</sup>, slightly greater angles of V-shaped lophs, and cingula well-developed on interior side. As for *E. obailiensis* and *E. sp.*, they are prominently smaller in size than other species of *Eudinoceras*, and preserve weak traces of preprotocrista and postprotocrista on the base parts of premolars. Furthermore, *E. obailiensis* distinctly preserve traces of the posterior wings of V-shaped lophs of procones in molars. These features strongly suggest their resemblances to *Metacoryphodon*. So I agree with Tong (1989a) by referring *E. obailiensis* and *E. sp.* to *Metacoryphodon*.

**Discussion** Huangzhuang Formation of Shandong established by Sha and Wang (1985), bears abundant mammalian fossils. At present, 9 genera including 15 species were made an generic identification by Shi (1989). Among the Huangzhuang fauna, 7 genera and 8 genera were found respectively in Irдинmahan fauna and Sharamurunian fauna. So that, Huangzhuang fauna can compare with both Irдинmahan fauna and Sharamurunian fauna. It is infered from these features that Huangzhuang fauna is of probable late Middle-Eocene to early Late-Eocene.

#### 图版 I 说明

泗水真恐角兽(新种) (*Eudinoceras sishuiensis* sp. nov.) ×1/3

1. 左 C<sup>1</sup>, 前视 (Left C<sup>1</sup>, anterior view), V10806—1

2. 右 C<sup>1</sup>, 侧视 (Right C<sup>1</sup>, lateral view), V10806—2

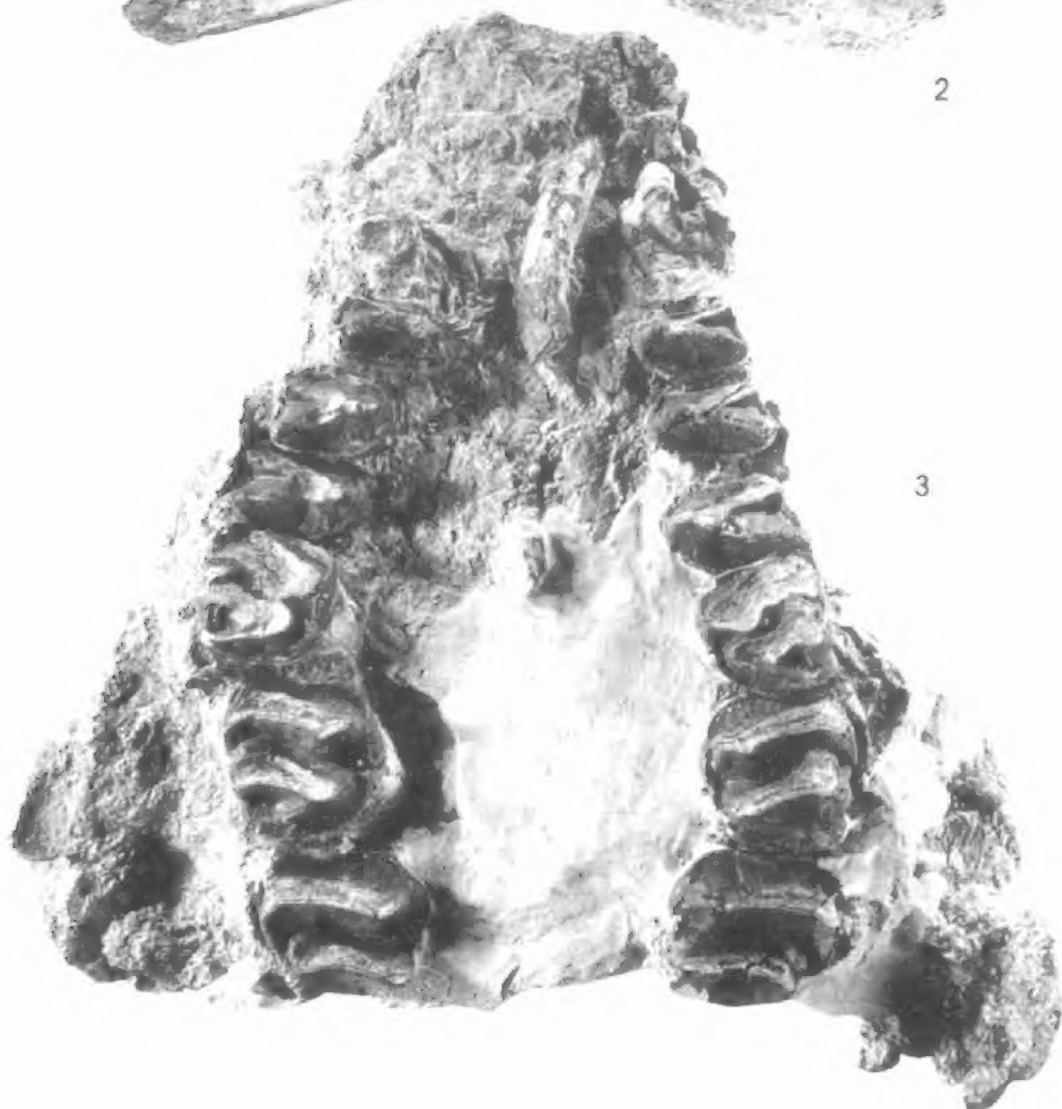
3. 上腭冠面视 (Occlusal view of palate), V10806—3



1



2



3